MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

PMT0201 – MATHEMATICS II

(All sections / Groups)

29 MAY 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **5 pages** only including the cover page with **4 Questions.**

2. Attempt **ALL FOUR** questions. The distribution of the marks for each question is given.

3. Please write your answers in the Answer Booklet provided, and **START EACH QUESTION ON A NEW PAGE.**

4. Show proper steps.

Question 1 (15 Marks)

(a) Suppose $P\left(x, -\frac{4}{11}\right)$ is on the unit circle in Quadrant III. Find its x-coordinate.

[2 marks]

(b) Suppose $\csc\theta = -\frac{5}{2}$ and $\cos\theta > 0$. Without calculator, find the exact value of $\tan\theta$.

[2 marks]

(c) Without calculator, find the exact value of

$$\sin^{-1}\left(\sin\left(\frac{8\pi}{7}\right)\right).$$

[2 marks]

(d) Let $y = 2\sin\left(\frac{x}{2} - \frac{\pi}{4}\right)$.

(i) Find the amplitude, period, and phase shift of the given y.

(ii) Sketch one complete period of $f(x) = 2\sin\left(\frac{x}{2}\right)$.

(iii) Then at the same graph, sketch one complete period of

$$y = 2\sin\left(\frac{x}{2} - \frac{\pi}{4}\right).$$

State clearly the x and y intercepts if exist. **[4.5 marks]**

(e) A triangle ABC has $b = 18$, $c = 24$ and $\angle A = 40°$.

(i) Sketch and solve the triangle ABC. Round your answers to **four** decimal places.

(ii) Find the area of the triangle ABC. **[4.5 marks]**

Continued...

Question 2 (10 Marks)

(a) (i) Use double angle formula to show that

$$\cos(x) = \pm\sqrt{\frac{1+\cos 2x}{2}}.$$

(ii) Then find $\cos\left(-\frac{\pi}{12}\right)$. **[3 marks]**

(b) Solve the equation $2\sin^2 x = 1 + \cos x$. **[3 marks]**

(d) Given that complex number $z = -2\sqrt{3} + 2i$.

(i) Graph z on the complex plane.

(ii) Then find the polar form of z .

(iii) Use **De Moivre's Theorem** to find z^4. Leave the answer in the form of $z^4 = a + bi$ where $a, b \in \Re$. **[4 marks]**

Continued...

Question 3 (10 Marks)

(a) Find the limits. Show at least one intermediate step.

(i) $\lim_{x\to\infty} \dfrac{14x^3 - x^2 + 6x}{3 + 8x^2 - 7x^3}$

(ii) $\lim_{x\to 0} \dfrac{\sin 9x}{6x}$

(iii) $\lim_{x\to 2^-} \dfrac{1}{(x-2)}$ **[4 marks]**

(b) Suppose the function

$$f(x) = \begin{cases} 2x - 8k & \text{if } x = 5 \\ \dfrac{x-5}{\sqrt{x+4}-3} & \text{if } x \neq 5 \end{cases}$$

is continuous at $x = 5$. Find the value of k. **[3 marks]**

(c) Use the **formal definition** of derivative to find $g'(2)$ when $g(x) = \sqrt{x+2}$.

[3 marks]

Continued...

Question 4 (15 Marks)

(a) Find the derivative for the functions below

(i) $y = x^2 e^{3x}$

(ii) $y = \dfrac{\cos x + 4}{\sin x}$ **[3 marks]**

(b) Find the absolute maximum and absolute minimum values of the function $f(x) = 2x^4 + 8x^3 - 7$ on the interval $[-4,4]$. **[4 marks]**

(c) Use **integration by parts** to find

$$\int x \ln(7x)\, dx .$$ **[4 marks]**

(d) Given the curves $y = x^2 + 2$ and $y = x + 4$,

(i) On the same axes sketch the graphs for the curves and find the points of intersections between the curves.

(ii) Find the area of region enclosed by the two curves. **[4 marks]**

End of Page.